INSIDE: A DISPATCH FROM THE UINTAS

UTAH DIVISION OF WILDLIFE RESOURCES • SUMMER 2005

fishing

SPECIAL ISSUE OF WILDLIFE REVIEW MAGAZINE

Timing for fishing
Success

Making room for
Rivers

Exposing a few
Tall fishing tales

Wildlife Review

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Photo, right: Lake Powell,
by Lynn Chamberlain

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Summer 2005

INSIDE

Special summer fishing issue

DIRECTOR'S MESSAGE

"As Director, I'm committed to maintaining and enhancing quality fishing opportunities throughout the state for all Utah anglers."

THANKS for picking up this issue of *Wildlife Review*, which we've packed with great articles about fish and fishing in Utah. It looks like we're out of the drought, and we've got plenty of quality water again. This spring and summer should bring the best fishing we've seen in many years. We'll actually see something we haven't seen for many years: heavy runoff. While that may delay stream and river fishing until mid-summer, we'll have great fishing in our lakes and reservoirs in the meantime.

James F. Karpowitz
UDWR Director

Whether you're a fly fisher, a worm dunker or a bass fanatic, Utah has something for everyone. From Lake Powell (my personal favorite) in the south to Bear Lake in the north, we are fortunate to have some of the best fishing anywhere in the Intermountain West. Outstanding waters like Strawberry, Flaming Gorge, the Green River, Scofield, Jordanelle, Willard Bay, Utah Lake, Quail Lake, Sand Hollow and many more offer a variety of opportunities.

Since being named Director in April, I've had a chance to travel the state and share my vision of the future of sport fishing in the state with many Division fisheries personnel and anglers. One thing is for sure: we're all on the same page when it comes to providing top-notch and diverse fishing opportunities for all anglers of Utah.

A critical component of quality fisheries is good, clean water and well-managed watersheds. We're fortunate that the Utah State Legislature has set aside $2.2 million for watershed improvement projects statewide. We'll use that money to do a number of cooperative stream, river and riparian zone habitat projects that will benefit wildlife as well as ranching and farming operations.

I also want to applaud the outstanding work that the Blue Ribbon Fisheries Advisory Council has done in identifying and enhancing the state's many blue ribbon lakes, reservoirs, rivers and streams. The Blue Ribbon Council works cooperatively with the Habitat Council and the state Legislature to provide essential funding for angler access and habitat projects on these quality waters.

As Director, I'm committed to maintaining and enhancing quality fishing opportunities throughout the state for all Utah anglers. We're fortunate that we have a talented, dedicated staff of aquatics biologists who are up to the job. I encourage you and your family to get out and go fishing as often as you can this year. It brings families together and creates memories you'll never forget. Good luck!

James F. Karpowitz

BY SCOTT ROOT
CENTRAL REGION CONSERVATION OUTREACH MANAGER

PREPARATION

The best time to fish

Which factors help determine success?

"Give a man a fish and you will feed him for a day; Give him a fishing pole and you will never see him again!"

THAT SENTIMENT from a bumper sticker I saw recently is indicative of the passion anglers feel toward fishing. Many of us would fish on a daily basis if possible. With the realities of life requiring most of us to work or attend school, we are rarely in a position to fish as often as we'd like. We often have to plan well in advance for a fishing trip so we have the best possible results when the opportunity to fish finally arrives.

Although the ultimate answer regarding the best time to fish is probably "whenever possible," there are other factors that should be considered when planning a fishing trip. Many people wonder if there is any merit to the concept that season, phases of the moon, time of day and weather affect fishing success. The answer to that question is ABSOLUTELY! While there are many other factors that also influence fishing success, we'll explore these four.

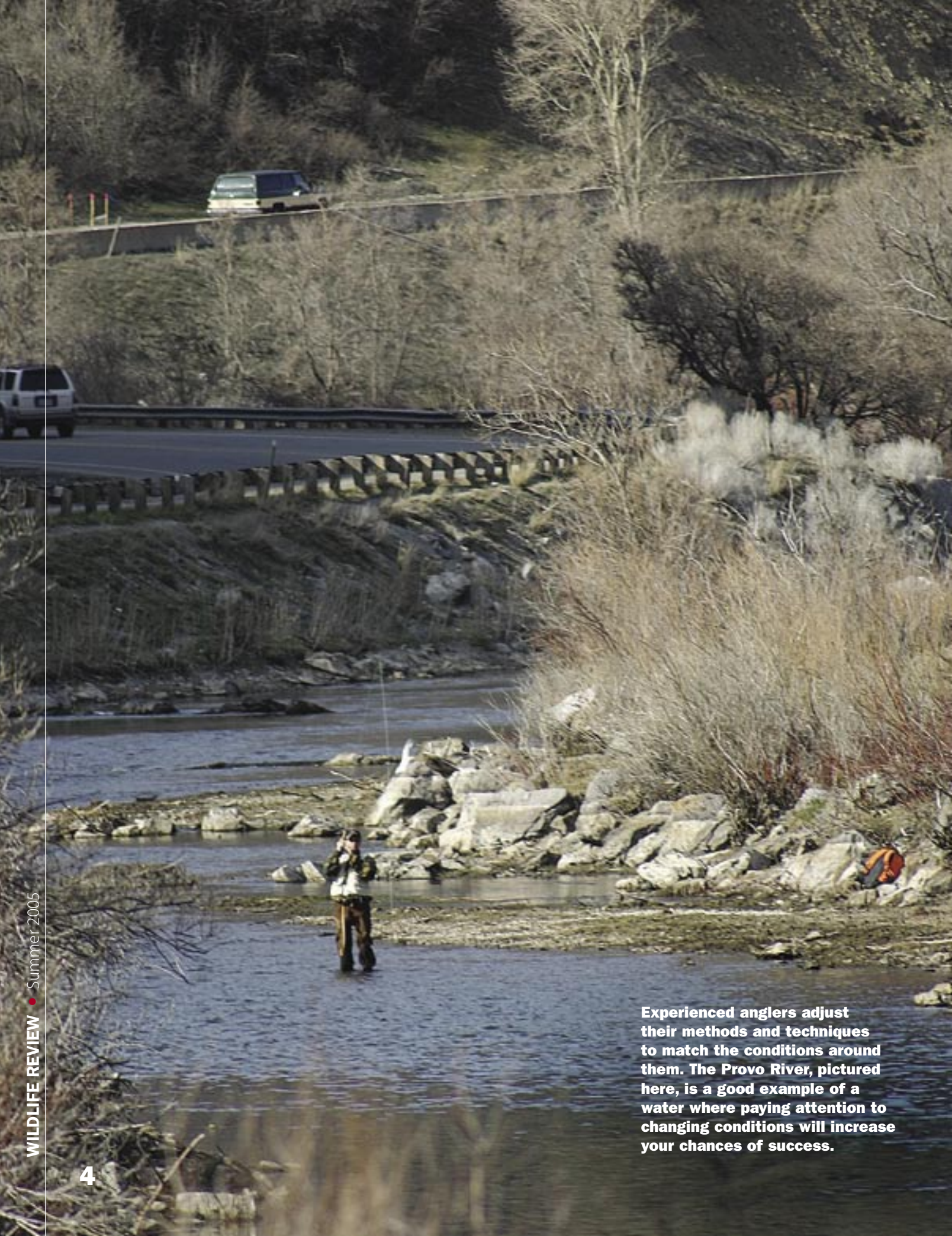
Season

Though fishing is generally good throughout the year in Utah, there are some seasons when fish tend to feed more actively. Usually, the best time to fish for each species is when the water reaches the optimum temperature for each species' metabolism. During that time, fish must eat more often to maintain optimal body condition. When the water temperature is too cold, fishes' metabolism slows down and they don't eat as often. When water temperature is too warm it's similar to people out on a very hot day; our bodies become stressed with the heat and we tend to lose our appetite. Walleye, for example, feed most actively when water temperatures are 65–70 degrees (generally mid-May to Mid-July).

In reservoirs, the water temperature changes with the seasons. During the summer and winter, there are two or more different temperature zones at different depths. Fish often congregate at the levels of a reservoir that have the temperature or amount of oxygen they need. A fish finder is useful for finding where fish are congregated. A general rule is that fishing near the shoreline tends to be better during spring and fall because water temperatures are consistent throughout the reservoir during these seasons and there is nothing holding the fish back from cruising the shoreline. Aquatic organisms tend to be numerous around the shoreline during these seasons as well.

You should match the right food

Fall brings on cooler temperatures and changing fishing conditions.



Experienced anglers adjust their methods and techniques to match the conditions around them. The Provo River, pictured here, is a good example of a water where paying attention to changing conditions will increase your chances of success.

source with the right season. For example, fly anglers know that a grasshopper imitation fished on the stream's surface in August can be very effective. This is the season that hoppers are abundant and often end up in the river. Fishing is truly like a game; at any time of year, the person who figures out the size, color, casting technique and other presentation factors when using baits, flies or lures will have the most success.

Knowing the spawning season of a fish species also is very helpful. The presentation of a shiny fish-imitating lure within the personal space of a spawning fish often will produce a strike at the offending lure. Nest-building and egg-guarding species like bass, bluegills and catfish are most easily caught during the spawn. Almost any type of lure retrieved through a bass or bluegill nest will be picked up. They don't typically want to eat the lure but they will grab it and take it out of the nest. Some anglers think it's unethical to fish during the spawn and choose to take a break during this time of the year.

Phases of the moon

Many seasoned anglers use moon phase charts to plan fishing trips. Moon phase charts are plastered throughout newspapers, fishing magazines, Web sites and can even be found on many GPS units. My fishing results don't always coincide with these charts, but much of my poor success probably can be attributed more to my fishing skills than the phase of the moon. Most anglers report consistency with the charts and actually look forward to phases that predict increased fish feeding activity.

Many anglers prefer fishing around the peak of the new and full moon phases. One prominent Utah angler told me he has found that during the full moon, mid-day fishing isn't as good, so he goes out during late afternoon, evening and at night. *In-Fisherman* magazine reports that regardless of species, many record-sized fish have been caught within three days on either side of the full moon. Most anglers seem to agree with these observations. I won't ever allow a moon phase to keep me from fishing, but it can be interesting to compare results with the moon phase.

Time of day

Many anglers, including me, spend considerable time fishing beneath the light of the moon. My experience has been that fishing for catfish is usually more productive during the evening hours. Anyone who has camped near a lake will agree that the surface of the lake comes to life with feeding fish during the first light of the day and the lower light at dusk. A dark-colored fly fished on the surface during these hours is often an effective technique for catching fish. Of course, many anglers simply prefer a warm summer day to fish. Many bass anglers report best success during the heat of the day. But, for most species, morning and evening are best.

Weather

Weather and barometric pressure affect fish feeding activity and fishing success. I have watched the surface of a lake as it bubbled with fish gorging themselves with insects knocked onto the water's surface from a rainstorm. Some of the largest fish I've caught were caught during the middle of a storm. I've also noticed that fishing can be excellent just before a storm arrives. Storms and lightning can be very dangerous so use caution, particularly if you are in a boat. In essence, when the weather is bad, the fishing just might be good.

In the end, you should let your own experience be your guide. I know fly fishermen who have fished the Provo River for more than 40 years and have kept a detailed journal to track the best fly for any given time of day or weather condition. They guard these secret historical journal entries with their lives. Experience is the only way to learn all the factors that determine the best time to fish.

The Utah Division of Wildlife Resources works extensively to provide anglers with tips and tools for a successful fishing trip no matter when, where, why or how you fish. The DWR's Web site, *wildlife.utah.gov*, provides weekly fishing reports, fish stocking information, fishing discussion forums, the fishing proclamation (the publication that describes fishing regulations), fish species information, and many other wildlife- and fishing-related topics. This is a great place to help you plan your fishing trip.

PHOTO BY SCOTT ROOT

Summers are perfect for fishing, especially early mornings and evenings.

BY RON STEWART
NORTHEASTERN REGION CONSERVATION OUTREACH MANAGER

INFORMATION

Hook 'em at an early age

A few tips on fishing with kids

I HAD TO SMILE as I hung up the phone. I'd just talked with my editor and agreed to write a story about summer hotspots and fishing techniques for kids. It reminded me of a day I spent fishing with my own kids, two boys.

I took my family to a small mountain lake that had melted out a few weeks earlier, but due to the drought there was almost no run-off. We launched our canoe and paddled into a bay where a small stream usually entered; this year it was only a trickle. The bay was narrow so we beached the boat and started fishing from shore.

We soon located a couple of hotspots by watching the water for fish rising. Within a few casts, my wife and I both had fish on. That would be the last time my wife and I caught fish that day.

My oldest boy took my pole while I helped my youngest untangle his line. Before it was untangled, the oldest had his first fish. Fortunately, my wife hooked into another and let the youngest reel it in. She wouldn't get her pole back for the rest of the day. From that point forward, I became the main netter. I have no idea how many fish the boys caught; I just know I was kept very busy. We kept a few that were injured and released the rest.

Trout

Summer run-off can be an excellent time to take kids trout fishing in mountain lakes and reservoirs. Trout will often congregate near or in the inlets and even along boat ramps. Some species might be there trying to spawn while others are hoping to have a meal washed in. While the water remains cool, trout species stay in the shallows, but as the summer progresses they move to deeper water and become more difficult to catch.

The tricks for trout are to imitate their natural prey and to fish when the water is cool. You can find cool water by fishing during the early or late seasons, during cool weather, at higher elevations or during the cool mornings and evenings.

Bluegill

Bluegill are another great kids' fishery. They are a tasty panfish, swim in large schools and thrive in warmwater ponds, shallow lakes and reservoirs. They don't grow big, but being an aggressive predator, they are easy to catch—excellent qualities for

PHOTO BY BRENT STETTLER

Many children are *hooked* from the moment they reel in their first fish.

a summer kids' fishery.

The trick with bluegill is to think small. They have a small mouth so they ignore large lures and big globs of bait. My boys have done well using small, brightly colored lures and plastic jigs resembling natural prey, such as tiny crayfish, insect larva, minnows and yellow octopus. Flies tipped with meal worms work well in winter and a similar combination also works well in summer. Or, try a worm on a small, long-shanked hook suspended about three or four feet below the bubble. A bubble can help with casting and also gives the kids something to watch.

In the spring, as the weather gets warmer, bluegill move into the shallows to spawn. The fishing action can be fast and furious. Locate small openings in the reeds and plop your hook in. Work the openings into the summer until the fish move into deeper, cooler waters.

Great places to take kids

Fishery	Fish	Comments
Flaming Gorge	smallmouth bass, rainbow trout	boats recommended
Pelican Lake	bluegill, largemouth bass	boats recommended
Red Fleet	bluegill, largemouth bass, rainbow	boats recommended
Pineview	bluegill, black crappie, yellow perch	
Salem Pond	bluegill	
Utah Lake	white bass, catfish	
Yuba	yellow perch, walleye, rainbow trout	
Deer Creek Res.	smallmouth bass, yellow perch	
Sand Hollow	largemouth bass, bluegill	
Lake Powell	smallmouth & largemouth bass, black crappie, striped bass	boats recommended
Quail Creek Res.	bluegill, largemouth bass	

Bass

Smallmouth and largemouth bass also make great fishing for kids, especially where the fish are over-abundant, as in Flaming Gorge Reservoir. Bass are another aggressive predator and usually are more active and accessible than trout during warmer weather.

Bass like structure. Smallmouth tend to prefer rocky structures while largemouth prefer more vegetative structures, but both seek out whatever structure is available.

Like bluegill, the trick to bass fishing with kids is to think smaller. Many adults target trophy-sized bass by using big lures or plastic jigs, often tipped with worms or other baits. The theory is big bass eat big meals. But the large size of the offering does limit the size of the bass that can take it. By using small lures and jigs, kids can catch the smaller, more abundant fish. Most kids, especially the younger ones and those just learning to fish, just want to catch fish; it doesn't matter if it's a big one.

Yellow perch and black crappie

Yellow perch and black crappie are other species of fish that lend themselves to a kids' fishery. Like bass and bluegill, yellow perch and black crappie are warmwater predators and often are found in great numbers. Again, smaller jigs, lures or flies work well. Tipping or adding a small piece of powerbait, a mealworm or a night crawler to the hook often can increase the chances of catching a fish.

Find the shade

Another favorite trick to catching all of these warmwater fish is to find the shade. When the water gets warmer in late spring and summer, fish often seek out shade. Fishing under trees or along shady rock walls often produces good results. Some of the best bluegill fishing my boys have had was directly under the canoe or a small inflatable raft. Large schools were attracted to the shade of the boats. The boys had a great time because they could see the fish below them as they jiggled their small, colored jigs.

Equipment

For some reason, tackle manufacturers tend to place extremely strong line on the reels they sell to beginners. These lines might be great for hauling logs up off the bottom, but they frustrate young anglers because they can't be cast easily or far. One of the first things I do after buying a beginner pole is replace the line with a better-quality six-pound test. This is heavy enough to pull through most snags but light enough to cast.

More tips

Other tips for fishing with young kids are to go prepared, be flexible and to remember you are there for them. Be sure to pack extra food, drinks, coats and clothes. At least one of my boys always manages to fall in and both eat more than I do when we are out.

Be flexible, especially with young kids. If they get bored with fishing, that's okay. Be ready to watch butterflies; catch grasshoppers, crayfish or aquatic insects; chase lizards and throw rocks. The goal behind fishing with kids is to let them have fun and discover the outdoors, not to catch their limit or break the state record. I've had several very successful fishing trips without ever throwing a line in the water.

Few things make a child happier or provide a greater sense of of accomplishment than catching a fish.

Now that the boys are older and better anglers, I can bring out my pole and fish along with them. They like getting out. Without good experiences early, they might have been more interested in staying home.

Good fishing locations can be found on the Fishing Report, a listing the Division maintains on its website and usually updates each week. Recent reports and fishing tips for most of the major waters can be found here but remember that not every water gets checked weekly and often there are long periods of time where the fishing doesn't really change much. Other good sources of information include local fishing stores, some of which maintain their own fishing boards and Web sites.

Well, I can't wait to cast a line. Wonder what my editor's going to do when the phone message keeps telling him I've gone fishing.

BY STEVE PHILLIPS

BELIEVE IT OR NOT

Fish stories

Exposing some popular fishing myths

ALL FISHERMEN ARE LIARS. They can't help it. The really good ones can spin the most mundane fishing lie into a narrative of epic proportions. They're the guys you see on TV. Over time, really big lies can evolve into myths. Myths abound in every culture but, among anglers, they often stir up trouble. I'm making it my mission to set the record straight on some of the most inaccurate fishing myths I've heard lately.

Myth: Carp are trash fish

This is my favorite myth. Now where did it come from? The truth is carp are highly prized food and game fish in Europe. In England today, zealous carp aficionados name their carp, tie special carp "flies" and practice catch-and-release (the fools!).

Well-meaning folks who thought they were doing anglers a favor brought carp to North America in the late 19th century. The fact that carp raised serious havoc with native fish habitat was … unfortunate. Turns out the habitat niche that carp occupied in North America was about 80 percent of all the water on the continent.

But now that they're here, let's take another look at this much-maligned fish. They're fun to catch, and (no myth) good to eat if properly prepared. Pound-for-pound, they are among the hardest fighting of all fish. They're great for kids, who don't care what they catch as long as it's fun. Next to sunfish and bluegill, carp are probably the most willing of fish for any kid with basic fishing gear and a jar of dough balls. A three-pound carp (about average size) will do more to teach a kid about fishing than any fishing simulator. Chances are there's a lake or pond within a few miles of about every kid in the state chock full of carp just waiting to be tempted. And if the bottom line is having fun, carp should be at or near the top of the list.

Here's one of my favorite fishing stories (and it's the truth, I swear): A few years ago we were doing a segment for *Utah Wild,* DWR's former TV show, about Bountiful Pond, a community fishery in Davis County. In the spring, the Division of Wildlife Resources stocks catchable rainbow trout in the pond, and we were circling the pond interviewing anglers about the pond's trout fishing. I approached one elderly, bearded gentleman and asked him if he was catching any trout. He responded in thickly accented, broken English, "No, no good fish!" Then he grinned and proudly held up a hefty stringer of carp. Turns out he was a Russian emigrant, who happily had found a pond full of his favorite fish. So much for the carp myth.

Myth: Fly fishing is hard

This is what purists and $500-fly-rod salesmen want you to think. Don't get me wrong: if you can afford top-of-the-line equipment, more power to you. But having top-of-the-line equipment doesn't necessarily mean you'll catch more fish. With a basic fly rod combo and a handful of basic fly patterns in various sizes (for example, Adams, royal Wulff, elk hair caddis, hare's ear, pheasant tail or woolly bugger), the average Joe can catch fish, and plenty of them. As for technique, I read somewhere that most trout are caught within 20 feet of an angler's feet. So much for the double haul of A River Runs Through It. A thing of beauty to be sure, but, for the most part, unnecessary.

> "MYTHS ABOUND IN EVERY CULTURE BUT, AMONG ANGLERS, THEY OFTEN STIR UP TROUBLE."

I first tried fly fishing at age 14 with a homemade rod I built from my Dad's fiberglass bait-casting rod and a neighbor's old, broken bamboo rod. I used an ancient silk fly line loaded on a Shakespeare auto-wind reel that I'd saved money for about six months to buy. I even tied a few hideous flies (without a vise). When I caught my first trout on a fly on the Duchesne River below Mirror Lake, I was astounded and hooked (so to speak). Those poor trout were starving and would have taken a bare hook properly presented but, heck, I caught one on a fly I tied myself. Wait a minute. This is starting to sound like another fishing story. The point is: fly fishing ain't that hard!

Myth: Catch & release is always good

This is a fishing myth that's really creating problems in Utah. The key word here is "always." Yes, catch-and-release is a good idea on many, perhaps most, Utah waters. But the most productive waters and prolific species require some harvest. Otherwise, fisheries inevitably spiral downward. For example, recent studies have shown that overpopulation of brown trout on the popular middle section of the Provo River below Jordanelle Reservoir is contributing to stunting and disease among brown trout.

The DWR has put up signs urging anglers to keep a few fish and even increased the limit on one stretch of the river in an effort to reduce trout numbers. But do you think we can get anglers on the river to keep a trout? Not on your life. It seems the agency, in league with conservation organizations like Trout Unlimited, has sold the concept of catch-and release too well. Peer pressure has put the kibosh on catch-and-keep. Any unfortunate angler who tries to sneak out of the parking lot with a stringer of fish gets the evil eye. Ironically, well-meaning anglers are contributing to the decline of one of their prized fisheries.

Several other Utah waters are facing a similar problem. Striped bass at Lake Powell are abundant. This voracious species is prone to classic "boom-and-bust" cycles. Stripers feed almost exclusively on threadfin shad at Powell. When shad numbers drop, which they naturally do every few years, we wind up with stripers that look like swimming skeletons. Wayne Gustaveson, the DWR fisheries manager at Lake Powell, has waged a one-man battle to educate anglers about the need to harvest stripers. Anyone who has fished the lower end of the lake extensively has probably met Wayne, or at least heard him on the radio espousing catch-and-keep striper fishing with almost religious zeal. Wayne led the charge to remove the limit on stripers a few years ago. Now, anglers at Lake Powell are encouraged to catch and keep as many striped bass as they can carry home, and the strategy seems to be working. The icing on the cake: striped bass fillets are great eating.

Brown trout on the Ogden and Blacksmith Fork rivers in Northern Utah have become super-abundant and somewhat stunted. Two factors have contributed to this change: the lack of fishing pressure and the lack of harvest. This is how it works: average anglers tend to shy away from brown trout fisheries because they're harder to catch than rainbows. Fly-fishing purists, who know how to catch brown trout, won't keep them. Then, as the average size of the fish goes down due to competition for available food, anglers lose interest in the fishery. The downward spiral continues until, finally, you've got a beautiful and productive stream full of stunted trout that nobody wants. To reverse this trend, the DWR is encouraging bait fishing and increased harvest on these waters.

Myth: Big water equals big fish

While popular fisheries like Strawberry, Bear Lake, the Green River, Flaming Gorge, Lake Powell, Fish Lake and Otter Creek produce their fair share of big fish, the really big ones are often found in the least likely spots. Small, highly productive spring creeks, streams, beaver ponds and small alpine lakes abound in Utah and they're often home to some of the biggest trout I've ever seen. Smaller waters are usually hard to fish and a challenge to even the most experienced angler. You don't hear a lot about them because fishermen not only are liars, but they're also selfish and secretive. Maybe that's a good thing, since these same waters are highly vulnerable to over-harvest. Catch-and-release *is* good in such places.

There are two ways that fish get big: grow fast in highly productive waters or live a long time in less productive or overlooked waters. To me, finding these overlooked and forgotten waters is what makes fishing in Utah so fun. Yes, there's the chance of catching a big fish. But, more importantly for me, an intrepid angler on a quest for a big fish in small water usually finds himself or herself all alone. It's that solitude in the pursuit of adventure that really appeals to me. And that's no lie.

BY PHIL DOUGLASS
NORTHERN REGION CONSERVATION OUTREACH MANAGER

PREDATOR

Tiger trout

A growing favorite with Utah anglers

Tiger, tiger, burning bright
In the forests of the night,
What immortal hand or eye
Could frame thy fearful symmetry?

In what distant deeps or skies
Burnt the fire of thine eyes?
On what wings dare he aspire?
What the hand dare seize the fire?

— From *The Tiger* by William Blake

AFTER CATCHING your first tiger trout, you learn quickly to grip your fishing rod tight and prepare for a tussle! Anyone who has caught a tiger trout might ask, "What the hand dare seize the fire?"

Those who chase these tigers in the fall are treated to the "burning bright" blaze orange and golden hues of the male fish. Tiger trout are a true predator that strike their prey with power, making them a great sport fish. When hooked, the fish often break water and flash their unique beauty to lucky anglers.

A good nonnative neighbor

In many areas of Utah, fisheries managers are working to restore native Colorado River and Bonneville cutthroat trout to some of their historical range. Brook trout, which compete with native cutthroats, are being removed from these waters. So managers are increasingly turning to tiger trout to make up for fewer fishing opportunities.

Tiger trout are a popular choice to place in waters with native cutthroats because they're sterile and can't reproduce. This allows fisheries managers to increase or decrease tiger trout numbers through stocking. It's fisheries science at its best when managers can provide great fishing while restoring native cutthroat trout.

Meeting the demand

The increased demand from fisheries managers for tiger trout has led the Division of Wildlife Resources' hatchery system to increase its capacity to raise them. In March 2005, more than 458,000 tiger trout were swimming in the raceways at the Fountain Green State Fish Hatchery.

Chad Hill, a wildlife specialist at the Fountain Green Hatchery, says the hatchery's advanced technology has increased the DWR's ability to successfully rear tiger trout. "The hatchery's oxygen injection system and baffles that remove solids from the water have really improved the productivity of the hatchery," Hill said.

In 2005, 54 lakes throughout Utah are scheduled to receive tiger trout. Most of the lakes will receive

The author displays a nice tiger trout that shows full autumn color.

the fish when they're three inches long, so it will take at least a year for these newly stocked tiger trout to reach catchable size.

In addition to providing fishing opportunities in places where brook trout have been removed, Craig Schaugaard, Northern Region aquatics manager for the DWR, says tiger trout also are being used to provide additional fishing opportunities to Northern Utah anglers.

"We've increased the number of waters in the region that will have tiger trout in them," Schaugaard said. "This year we have eight reservoirs that will receive nearly 200,000 tiger trout." Four of those waters are in the Uintas.

Hatchery-raised tiger trout are a sterile hybrid cross between a female brown trout and a male brook trout. A few states have reported that some tiger trout have been produced naturally, but this occurrence is very rare. A "wild" tiger trout was caught in California in 1957. This wild variant was reported to be a cross between a female brown trout and a male brook trout, the same tiger trout cross produced in hatcheries. In the early 1980s, a wild tiger trout was caught in Utah's Blacksmith Fork River, but none have been reported to the DWR since that catch.

A growing favorite

For anglers, tiger trout are captivating. Hill has heard favorable comments from anglers about the table qualities of tiger trout, with some anglers noting that they are especially tasty when smoked. Reece Stein of KUTV Channel 2 considers the tiger trout one of his favorite fish. He does most of his tiger trout fishing on Manti Mountain with a fly rod and streamer.

> "TIGER TROUT ARE A TRUE PREDATOR THAT STRIKE THEIR PREY WITH POWER, MAKING THEM A GREAT SPORT FISH."

The current Utah tiger trout record is a 23-inch long fish that weighed 5 pounds 13 ounces and had a girth of 15 inches. It was taken from Floating Island Lake on the Boulder Mountains. Fisheries managers say the tiger trout record is broken nearly every year. Based on the fish's growth rate, the record should continue to be broken in years to come.

Fishing tips

Anglers who pursue tiger trout should remember that these fish are predators, and lures should be presented in ways that trigger the tiger trout to strike. Try various speeds and retrieves. Also, try to imitate a prey fish that is injured or "easy pickins" for these opportunistic predators. When tiger trout strike rapalas, they typically hit the lure from underneath it.

Fly anglers routinely fish for tigers with wooly buggers or other streamers. For ice fishing, when the fish's metabolism is reduced and they're less aggressive, try flashy attractors tied above small baits such as wax worms, mealworms or freshwater shrimp.

Hatchery-raised tiger trout are a sterile hybrid cross between a female brown trout and a male brook trout.

BY TERRY C. HOWICK
FOUNTAIN GREEN STATE FISH HATCHERY SUPERVISOR

UINTA MOUNTAINS

High country

A dispatch from the Uinta lakes

I'M SITTING on a high divide just below the timberline, around 10,000 feet, where the headwaters of the Weber and Duchesne rivers meet. In this high place, winter stays a long time, and summer is short-lived but glorious. Summer here is full of wild flowers, alpine grasses and green conifers. It's the time of day when shadows are growing long. Directly north looms Bald Mountain. Dark pines stretch down to the water's edge from the mountain's steep slopes. Mirror Lake lies quiet and still. The only ripple on the water is from fish rising. To the east, Hayden's peak stands with its rocky top and talus slopes. Fishing here at Mirror Lake has been lively and fast with flies this evening. Rainbow and brook trout dominate the creel at this lake, though we've also caught albino rainbows.

In Utah we have a wide variety of fishing: warm and coolwater fishing for panfish, small and largemouth bass, striped bass, perch and walleye; put-and-take rainbow fisheries for families with eager youngsters; reservoirs with cutthroat trout and kokanee salmon; trophy fisheries for lake trout and splake; streams and rivers famous for their great fishing; and high-elevation waters containing brook, cutthroat and grayling like those of the Uinta mountains. Each angler has his or her favorite type of fishing. I love to fish the high lakes of the Uintas.

A few miles down the road from Mirror Lake are four roadside lakes that contain rainbow, brook and, in two of these waters, albino rainbow trout. Recent introductions also have brought tiger trout to two of these waters. The Kamas State Fish Hatchery regularly stocks these roadside waters with rainbows as soon as the snow is gone. A quick check of the USGS 7.5-minute topographical map shows several lakes just behind these lakes, although not on the road. Many of these fisheries are tucked away just out of sight of the road. Checking the map further reveals a trailhead that accesses two different lake areas that are about 5- to 7-mile walks round trip. These hikes take anglers past eight to 12 lakes that contain brook, cutthroat or grayling.

These lakes are in the Provo River drainage, which, in all, has 55 lakes or reservoirs that contain game fish. Most of these are within 3 to 5 miles of a road. If you check the USGS Mirror Lake topographical map 1/24,000 scale, which represents approximately a 6- by 8-mile piece of the mountain, you will see 78 waters with viable fish populations. If one lake is not producing, try another; it is probably not far away. These lakes are scattered across the headwaters of the Provo, Duchesne and Weber River drainages.

The Uinta Mountains lie in the

Summer arrives late in the Uintas, but the fishing is worth the wait.

Scattered across the Uinta Mountains are more than 1,000 lakes and ponds. For those able and willing to do some hiking, these backcountry waters offer solitude, good fishing and incredible scenery.

northeast corner of Utah between Kamas on the west and Flaming Gorge on the east. The Wyoming state line borders the mountains on the north, and the Uinta Basin is the southern boundary. Mountain elevations range from 7,000 to more than 13,000 feet above sea level, but most waters are between 8,500 to 9,500 feet. More than 1,000 lakes have been studied and documented, and the Utah Division of Wildlife Resources manages more than 650 lakes and reservoirs. About 15 percent of these waters are self-sustaining, but most require stocking of three-inch fingerling to maintain these backcountry fisheries. The waters are stocked on a one- to six-year rotating cycle depending on fishing pressure, habitat and natural recruitment.

The lakes are as varied as the landscape. Each has its own unique set of features and beauty. They range in size from hundreds of acres to less than one. Many lakes are surrounded by timber and provide good fishing. Other lakes occur in meadows, while still others are above the timberline and do not have fish in them. Some are very deep while others are just a few feet. One lake high in the West Fork of Beaver Creek has a large population of brook trout, but is not more than 2.5 feet deep. I believe one reason this lake sustains a fishery is because there are many springs that cascade down small terraces to feed the lake.

Species of fish that are available to anglers in the High Unitas include brook trout, cutthroat trout, rainbow trout, albino rainbow trout, arctic grayling, tiger trout and possibly golden trout. Brook trout occur in 80 percent of the lakes while cutthroat occur in approximately 40 percent. Twenty percent of the fisheries contain both species. Arctic grayling have been stocked in 28 waters, but I suspect only persist in three-quarters of those. Rainbows are only stocked into roadside lakes where fishing pressure is the greatest. Tiger trout have been stocked into a few roadside lakes, and they're proving to be great additions to those fisheries. Golden trout were last stocked in two areas in the 1970s, but the last survey data in the 1980s showed just a few fish remaining.

The Utah Division of Wildlife Resources uses several hatcheries to supply fish to keep these alpine fisheries productive.

Smaller fish, such as three-inch-or-smaller cutthroat, are flown over backcountry lakes by small airplanes and dropped in the water in early July. Larger fish, such as 10-inch rainbow trout, are usually brought in with stocking trucks.

To fish these high waters, I start with a map of the area I want to visit. I always take along a compass too. Remember you have to find these lakes before you can wet your line. I like to take along the Lakes of the High Uintas booklets, which are available at Division offices. These booklets cost between $1 and $2 and contain information on how to access the lakes, primitive camping sites, spring water, physical descriptions of the lakes, what types of fish are in each lake and other pertinent information. Some of the booklets have not been updated for many years, but they still supply the best information available for the price.

I have seen bait anglers do fairly well with worms on the bottom when brook and rainbow trout are present. Anglers with spoons or other hardware in gold, silver or red do equally well but all kinds of aquatic plants and other debris are in the water, so watch where you cast. I believe fly anglers do the best in the high-lake setting. Don't worry if you don't have a fly pole or know how to use one, because lots of fish are caught by anglers with spinning rods who cast flies using bubbles. In many areas the spinning rod and bubble are superior to the traditional fly fishing methods because the fish are too far out to reach with a fly rod. Also, many of the lakes have no room for back casts due to vegetation or rocks. A traditional fly fisherman can do well in the right situation, though. Nothing beats a fly rod for a natural presentation of artificial flies. Fly selection is as varied as the lakes of the Uintas. I often use caddis imitations in brown, green or black; ants in black, brown, and/or reds; Adams; white Millers and anything that looks like a mosquito. Oh, bring lots of bug repellant, too.

Well, I've spent enough time talking about fishing the Uinta lakes. I need to get back to fishing before the sun goes down. I know where there is a little lake about a half mile from here that is always good for a nice brook trout or two. Good luck and good fishin'.

BY STACEY JONES
CONSERVATION OFFICER, SOUTHEASTERN REGION

LAW ENFORCEMENT

Protecting fisheries

Regulations keep tributaries productive

TAKE A GLANCE through a Utah Fishing Proclamation and you'll quickly see that Utah has a lot of tributaries, many of which are closed to fishing during certain times of the year. You'll also notice that many waters have artificial-fly-and-lure-only restrictions.

Tributaries and the regulations that keep them healthy have provided the foundation for some of Utah's best fishing, so it's important for anglers to understand these regulations.

Tributaries

A tributary is any stream that flows into a larger stream, lake or reservoir. The reason so many tributaries are closed to fishing in the spring and fall is a little complex, but the benefits of these closures is pretty exciting.

Left, the Upper Provo River along the Mirror Lake Highway in the Uinta Mountains.

The spawning season

Every year in lakes across Utah fish that are members of the salmonid family—including trout and salmon—swim into nearby tributaries to reproduce, or spawn.

Fish feed heavily before the spawning season to prepare for the physical demands of traveling upstream. Both cutthroat and rainbow trout become more colorful during the spawning period. The lower jaw of the male trout also may change to a "hooked" shape and a pronounced hump may appear on his back.

As the spawning season begins, the female trout travels upstream to find a place to develop her nest, called a "redd," where she will lay her eggs. Redds are usually shallow, pebble-covered areas where swift, 45-to-55-degree, highly oxygenated water flows. The female deposits her eggs in the redd, and then the eggs are fertilized by one or more male trout. The eggs later hatch into small fish called "fry." The fry grow bigger during the following months.

After the spawning season, the trout usually return to the body of water they came from. The following year, they'll swim upstream again to repeat the spawn. Some members of the salmonid family, such as kokanee salmon, die after the spawning season is over.

Protecting spawning fish

For many species of trout, such as cutthroat and rainbow trout, the spawning season happens when the spring runoff begins. Water levels are usually high at the start of the runoff, which allows spawning trout to move upstream with fewer barriers.

Unfortunately, spring is the same time of year many anglers are itching to start the fishing season. It's easy for anglers to see trout staging in streams. (Staging is the time when the trout are beginning their voyage upstream. They're congregated at this time and are very visible.) When trout are staging, over-anxious anglers easily catch them by snagging the fish in the body with a fishing hook, by dip netting or even by hand.

Those who abuse closed-water regulations inflict great damage to the fishery. For example, when an angler removes a large female trout before she has laid her eggs, he is not only removing the fish he caught, but potentially hundreds or even thousands of new fish. The same thing happens when an angler removes a male trout before he can fertilize a female's eggs—in addition to the male trout that's lost, hundreds or even thousands of new fish could be lost too.

Anglers who wade through streams to catch, or even just to view, fish also can harm the fishery by damaging redds and smashing eggs. The sensitive streamside vegetation that protects the stream channel from erosion also can be damaged by anglers walking up and down the stream bank.

In addition to trout that spawn in the spring, kokanee salmon, brook trout and brown trout spawn in the

fall. Breaking fall closure rules can be tempting for those who want to take a break from hunting to catch a fish during the fall spawning run.

Division of Wildlife Resources' conservation officers are vigorous in their enforcement of these rules. Whether it's a tributary that can be viewed easily from a road or in a roadless area that takes hours to hike to, conservation officers are on the lookout for people who break tributary closure rules. The citations officers issue are a management tool. Allowing the fish in the stream to successfully reproduce gives anglers more opportunities to catch healthy, wild trout in the future.

Large spawner illegally caught in Fish Creek above Scofield Reservoir.

It's worth the wait

Some of the best fishing anglers will find in Utah's rivers and streams happens when tributaries reopen to fishing after the spawning season. Many fish usually are available as they migrate back to the body of water they came from. This is a great time for families with children to visit rivers and streams. Fishing success is generally higher than at other times of the year, and there's a good chance you'll catch larger, mature fish. If everyone obeys the seasonal closure regulations, plenty of wild trout should be available for anglers to catch every year.

Artificial-fly-and-lure-only restrictions

Bait fishing can be harmful to fish populations in certain waters. The number of fish that die after being caught and released, called "hooking mortality," can be extremely high at waters where bait fishing is allowed. Hooking mortality usually occurs when a hook is swallowed or imbedded deep in a fish's throat. Studies suggest hooking mortality occurs most often when anglers are bait fishing.

Small gobs of powerbait, worms or cheese wrapped around a treble hook (which is often barbed to hold the bait to the hook) are easy for a fish to swallow. When an angler tries to remove a treble hook, the fish usually begins to bleed. Removing a swallowed treble hook is almost always fatal for the fish. The fish may appear to be okay as it swims away, but fish that have swallowed a hook often die shortly after being released.

The single hook used on most artificial flies and some lures, however, usually snags on the lips of the fish. An angler can remove the single hook easily, often without any damage to the fish. The fish then can be released for another angler to catch.

When using bait, catch-and-release fishing should be exercised with caution. Any fish caught with bait, unless it is only hooked in the mouth, should be kept and counted as part of your daily bag limit. If you need to release a fish you've hooked deeply, it's best to cut the line and leave the hook in the fish. Studies show that the survival of deeply hooked fish is higher if the hook is left in the fish (the hook often will dissolve inside the fish).

In addition, fish that are placed on a stringer, in a basket or in a live well also should never be released. The lack of constant fluid through the fish's gills slowly suffocates it. Fish that are held this way and then released may look okay, and may even swim away, but there's a good chance they'll soon die. That's one reason why it's against the law to release trout and salmon that have been held as part of your bag limit.

Artificial-fly-and-lure-only regulations help control the over-harvest of fish, prolong fish's life span, increase fish sizes and reduce the number of fish that die after being caught and released. These regulations often are placed on new fisheries to allow anglers a chance to fish while keeping plenty of fish in the fishery to help it grow and develop.

Anglers often violate artificial-fly-and-lure-only regulations because the potential of catching a trophy trout with a worm or PowerBait is too tempting. The fish in artificial-fly-and-lure-only zones often are large or have a specific trophy quality about them, which makes the fish worth protecting with special regulations.

Author's Note: Many thanks to DWR fisheries biologist Justin Hart for his technical assistance with this article.

BY ANDREW CUSHING
URBAN FISHERIES BIOLOGIST

VOLUNTEERS

In their words

Volunteers help kids learn to fish

WORKING with kids and volunteers in youth fishing clubs in Utah is the best part of my job as the Division of Wildlife Resources' urban fisheries biologist.

The DWR and local communities set the clubs up, but adult volunteers make them work. I was going to interview some of those volunteers to write a story about the value of the program through their eyes. But, as I talked to the volunteers about their experiences, I realized that anything I said would only take away from their own stories, in their own words.

So, allow me to introduce you to some of Utah's finest volunteers, who I hope will provide a glimpse into the true value of volunteering in Utah's youth fishing clubs.

Ken Cottle
Ogden City Youth Fishing Program Volunteer

One child in our community fishing program really stands out in my mind. Bailey started in our club when she was six years old. She tried very hard to follow the instructions on how to catch a fish, but was unable to catch one. With tears in her eyes, she said, "I will never catch a fish in my whole life!"

A year later, Bailey, now seven years old, returned to our club. She was very determined and worked very hard to develop her fishing skills. Bailey and her friend never missed a session. About two weeks into the program, something wonderful happened: she caught her first fish! With tears of joy, she carefully took the fish home. The next week she not only caught one fish, but she caught her first limit of fish! Bailey told me, "I am the fishing queen of the club!"

Richard Baldwin
Murray City Youth Fishing Program Volunteer

Volunteering for the DWR Youth Fishing Clubs costs me nothing but time. And the time I spend with these kids is precious, rewarding and loaded with thrills.

The young people who participate in the clubs take to the ponds like Ahab (the most ambitious fisherman of all time) in pursuit of that one big fish. Some storm the shoreline with Sponge Bob lunch pales that have been converted to tackle boxes. Others bring real tackle boxes given to them by their parents or grandparents. Some of those boxes have a dozen fold-out drawers and weigh 25 pounds loaded!

Many of these kids never have touched a fishing pole. Others know more about fishing than I do. All of the kids are a treat to watch and help.

One youngster asked me to cast his line because he wanted

Often, it's hard to tell who has the most fun—the kids or the volunteers.

it out farther. I am not good with covered push-button reels, but I agreed to try. Eight weights had been placed on the line, so there was enough weight to make it cast far. I launched his line, but it plopped only 15 feet in front of us. I had that ugly gut feeling that I had tangled the line in his reel.

We opened the reel and found the line wasn't tangled and that it was tied properly to the reel. After 25 casts, we finally figured out why we couldn't cast it farther: there was only 15 feet of line in the reel! Yes, we were a little slow, but in the end we were victorious.

> "TO WATCH THOSE LITTLE RASCALS GO FROM CLUELESS TO COMPETENT IN JUST A FEW SHORT WEEKS MAKES ME FEEL THERE IS HOPE FOR THE FUTURE."

The persistence of these kids is amazing. One small eight-year-old angler spent 20 minutes trying to put a nine-inch trout into a four-inch sandwich bag so she could take it home to show her mom. I ran to my truck to get her a larger bag. When I returned, the fish was "magically" folded in the sandwich bag. A Kodak moment.

Volunteers need certain qualities: common sense, patience, the ability to keep kids safe, a desire to introduce young people to fishing, and the ability to untangle knotted fishing line. The DWR provides on-the-job training in fishing etiquette, worm wrangling and the other necessary skills.

Jim and Jerry Morkin
Ogden City Youth Fishing Club Volunteers

In spite of the fact that my spouse and I are in our late 70s and early 80s, being volunteers at our community fishery keeps us young and active. It takes me a long way back to the time spent with my dad during the Depression years, when fishing was both a vocation and a way to put food on the table. In this age of fast food, fishing may not be as necessary, but it is a great character builder for the young ones who some day will hold the reins of our nation in their hands.

Those who understand and value our natural world will be the best choice for leadership, if for no other reason than they carry the knowledge that beings other than ourselves populate this planet and that all of us are in the same boat.

Besides, it's just plain fun! To watch those little rascals go from clueless to competent in just a few short weeks makes me feel there is hope for the future. Those tykes go from being totally unaware of the arts of angling to a level of proficiency I did not think they could achieve. They learn the effects of weather, times of day, seasons of the year, types of fishes, food chains, equipment, care of their equipment and more.

By the end of the program, they have begun to be selective in their harvest habits, even getting a little choosy. And I truly think the parents and guardians who accompany those kids have as much or more fun than the kids. I had no idea that young mothers (and sometimes grandmothers) would climb trees to retrieve fouled fishing lines. And for once the cost of participation is reasonable: five bucks for the whole class, equipment, bait and teachers. Even the fishing water is furnished. What a deal.

Kim Colman
Bountiful City Youth Fishing Club Volunteer

When I started in the Youth Fishing program three years ago, I was looking for a way to complete my required Dedicated Hunter service hours. I thought, "Hey, this is five minutes from home, and it would give me a chance to have fun teaching kids how to fish." I've always enjoyed teaching people if they are excited to learn, and I soon found out that these kids are excited to learn about fishing.

The program introduces kids to fishing with the help of adult volunteers in a small group setting. Through this program, many young people have been introduced to the joy of fishing, and we often help kids catch their first fish.

The volunteers also benefit. We have the opportunity to brush up on our own skills, share those skills with the next generation, feel the reward of helping others, get Dedicated Hunter service hours, and feel absolutely great when we help those kids catch a fish. By far, the greatest of all the rewards has been seeing

Get *hooked!*

Would you like to become a youth fishing club volunteer?

Youth fishing clubs have been established in communities stretching from Logan to Santaquin. Training sessions to train new adult volunteers are held every February in communities where fishing clubs have been established.

To learn more about becoming a Youth Fishing Club volunteer, please contact Drew Cushing at (801) 538-4774 or *andrewcushing@utah.gov.*

the excitement of those kids each week as they arrive to learn more about fishing and their environment.

Along with the program's success and growth has come a challenge: We need more volunteers. Help get our kids back out in the fresh air and the wilds and see them experience the things that you and I have valued and enjoyed all our lives. Think of the fond memories you have of fishing with family and friends. It's not television or other entertainment we remember, but those special outings. We need to save those things before the new generations forget they ever existed. Without programs like the Community Fisheries program, ours will soon be an extinct lifestyle.

Introducing a child to fishing can lead to a lifetime of enjoyment and appreciation for wildlife and nature.

BY RUSS LAWRENCE
NORTHERN REGION AQUATIC HABITAT BIOLOGIST

AND JOHN FAIRCHILD
HABITAT CONSERVATION COORDINATOR

AND PAUL BURNETT
NORTHERN REGION AQUATIC BIOLOGIST

HABITAT

Making room for rivers

Restoring critical riparian areas

TO HUMANS, floods can seem like rare, frightening events that cause widespread damage. In fact, flooding across Utah this year has shown that floods *can* be dangerous for human communities.

But flooding is a natural, and critical, part of life in healthy rivers. And since most of Utah's wildlife depend on healthy rivers and riverside habitats, the Division of Wildlife Resources has made it a priority to ensure that Utah's rivers have room to flood wherever those floods will not threaten human developments.

Riparian zones

The riparian zone—the green, vegetated zone adjacent to streams and rivers—provides important habitat for more than 80 percent of Utah's wildlife species during the course of a year. Many species are attracted to the trees, shrubs and leafy plants that grow in riparian areas because of the abundant moisture the areas receive. Periodic disturbance from flooding helps maintain a well-developed riparian zone and aquatic habitat over time.

And that's where the problem for riparian areas lies. Not all areas near rivers and streams can be permitted to support an expansive riparian zone through flooding. There's just not enough room for rivers to flood without causing catastrophic damage to transportation corridors, residential developments or farmland. It's against this backdrop of competing needs that the DWR is working to protect and restore key riparian areas while also protecting human interests.

Balancing risks

Biologists group the state's rivers into two main categories: high risk and low risk. Should flooding occur, high-risk rivers are at greater risk for damaging human developments such as roads, farms or homes. This risk limits the options available to biologists working to restore the rivers, as there is little room for error. Low-risk rivers, on the other hand, offer biologists more options as floods here run little risk of damaging human property or infrastructure.

Two rivers in northern Utah offer examples of river restoration in high-risk areas.

Many years ago, the Weber River from Wanship to Uintah was straightened to accommodate nearby trans-

portation corridors (a highway and railroad) and was rerouted away from farmland. In addition, many sections were extensively dredged to increase the capacity of the river channel to carry water. These and other actions limit flooding, and the high flows that are now contained in the river erode the riverbanks and deepen the river channel.

DWR aquatic biologists have worked with landowners to reduce the erosion by sloping the banks and installing habitat structures ("J-hook" vanes) and grade control structures (cross vanes) in key locations. When angled upstream at certain slopes and angles, the structures protect stream banks and create deep pools immediately downstream from the structures. Many of these structures also include a root wad, which is submerged in the pool to provide cover for fish.

Tree and shrub plantings along riverbanks help stabilize the soil and provide additional wildlife habitat. Since 1997, the DWR has stabilized riverbanks and enhanced important riparian habitat on nine miles of the Weber River.

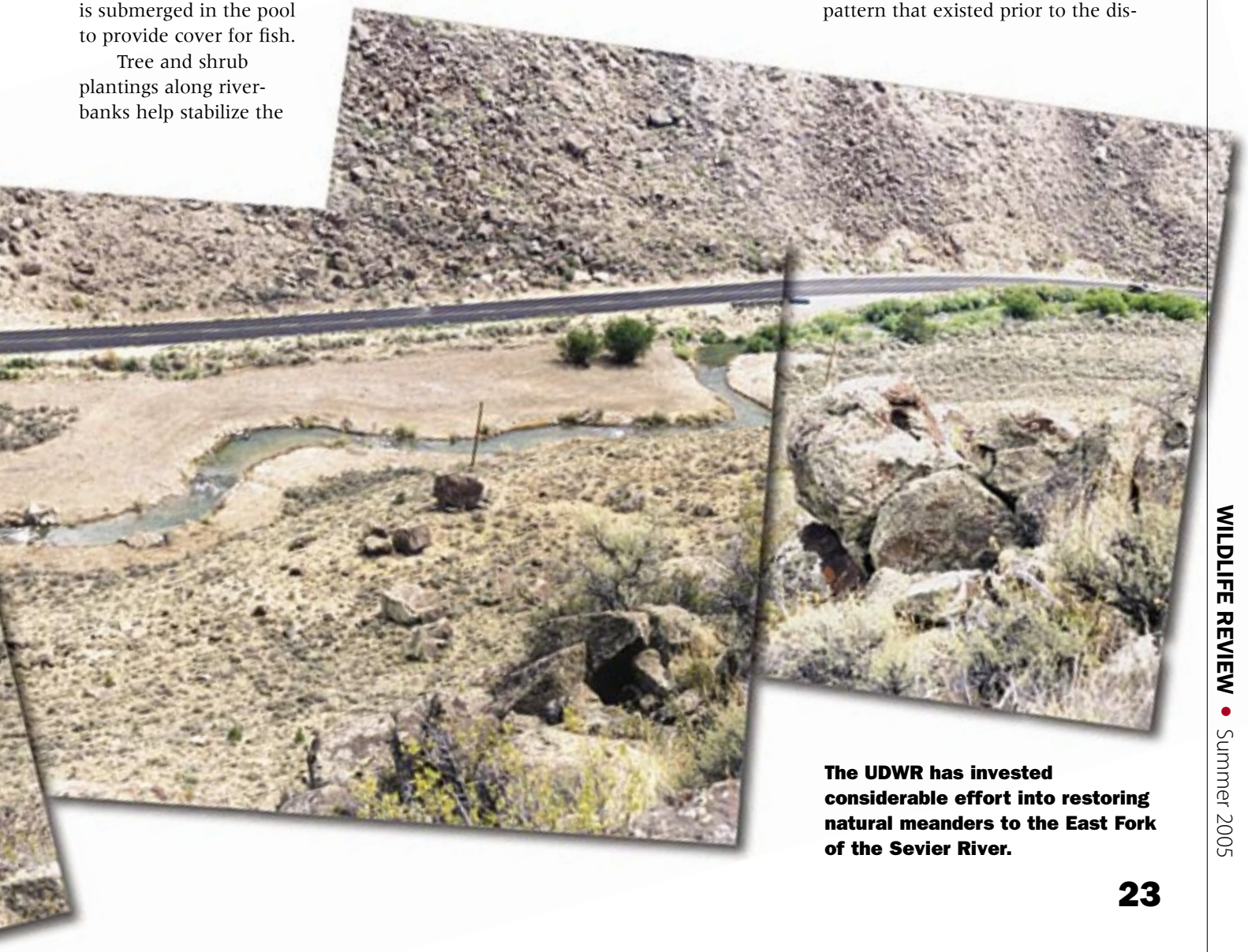
The other high-risk area in Northern Utah is the section of the Provo River between Jordanelle and Deer Creek reservoirs. Much of this section was straightened and diked in the 1950s to protect lands in the Heber Valley from flooding.

The Central Utah Project Completion Act authorized funding to restore habitat and provide angler access throughout this section of the river. Initial plans called for "restoring" the river in various places using instream structures to improve fish habitat. Under the direction of the Utah Reclamation, Mitigation and Conservation Commission (URMCC), the scope of the project expanded to include dike removal, reestablishment of the river's natural meander pattern and riparian plantings.

To accomplish this work, the URMCC has purchased a corridor wide enough to support periodic flooding without affecting private property. The combination of riparian plantings and periodic flooding will encourage the existing cottonwood forest near the river to expand significantly.

Making meanders

Not all Utah streams are confined between roads and homes. If stream restoration is needed in these lower-risk areas, restoration work usually involves a combination of reestablishing the natural meander pattern that existed prior to the dis-



The UDWR has invested considerable effort into restoring natural meanders to the East Fork of the Sevier River.

turbance, installing habitat structures and planting riparian vegetation. By matching the natural tendency of the stream to wander in a predictable pattern, aquatic biologists can restore the stream length, which is key to a more functional river system.

Biologists determine the proper pattern and profile of the river by matching the restoration area with "reference reaches," or sections of the river that have similar characteristics and are still in good condition. Biologists look for a section with stable banks, an active floodplain, a low width-to-depth ratio and a well-developed riparian zone.

Examples of restoration projects in lower-risk areas can be seen on the East Fork of the Sevier River between Osiris and Antimony and on Thistle Creek between Indianola and its confluence with Soldier Creek.

A little help from our friends

Placing structures in a river or stream is only part of the project to restore it. An equally important part is getting riparian vegetation established along the stream bank and other places in the river corridor where sufficient moisture is available.

With the help of landowners, angler groups, Dedicated Hunters, school groups, special interest groups, Boy Scouts and concerned individuals, the DWR is planting willow, dogwood, cottonwood and other riparian plants along Utah's streams. These riparian plants serve many important functions, including: 1) purifying water by removing sediments and other contaminants, 2) reducing the flood risk and damage associated with flooding, 3) reducing stream channel and stream bank erosion, 4) supporting a diversity of plant and wildlife species, and 5) maintaining habitat for healthy fish populations.

Moving forward

Over the years, the DWR and other agencies have used a variety of instream structures in river enhancement and riparian restoration projects. Most of the structures were designed to improve fish habitat, but the structures failed to keep sediment moving downstream, which is critical for healthy streams. More recently, the DWR has installed "J-hook" vanes and cross vanes developed by Dave Rosgen, a retired U.S. Forest Service hydrologist. These vanes have done a great job of keeping sediments moving downstream. Courses offered by river restoration consultants and Utah State University have provided DWR biologists with the training required to plan and implement effective projects statewide.

River enhancement and riparian restoration has long been a DWR priority, but the program got a boost in 1995 when the Utah Legislature established the Wildlife Habitat Account. The account is a separate source of funds within the DWR for fish and wildlife habitat conservation and improved public access for hunting and fishing. A portion of the revenue received from the sale of each license and tag is placed directly into the account. The legislation also created the Habitat Council to provide guidance to the DWR in how to use the funds.

The Blue Ribbon Fisheries Advisory Council also plays a critical role in funding river enhancement and riparian restoration projects in waters throughout Utah that have been classified as "blue ribbon" waters.

The reasons for restoration work are varied, but the goals and results are always the same: creating high-quality habitat for fish and wildlife. And with good tools and training, support from a wide variety of Utahns and a little room to work, DWR biologists are making that happen.

Stream restoration often requires the use of heavy earth-moving equipment.

BY DIANA VOS
PROJECT WILD COORDINATOR

REPRODUCTION

Fish facts of life

Fish breeding behavior & development

UNDERWATER, the facts of life are not about the birds and the bees. But for Utah's diverse fish species, breeding—called spawning—is just as important, and interesting to learn about, as wildlife breeding on land.

Spring fever

Fish become aware of spring's arrival by the changing angle of the sun and increased day length spring brings. This changing length of day, called *photoperiod,* causes changes in hormone levels that signal to most fish that it's time to spawn.

The age at which different fishes reach sexual maturity varies. In most cases, the shorter a species' lifespan, the earlier it reaches sexual maturity. Salmon require two to five years to reach maturity, and after spawning they die. Species such as bass and trout usually spawn every year once they are mature whereas some eels may only spawn once every 10 to 12 years.

Each species of fish prefers a specific kind of habitat for spawning. Many fish migrate to spawning areas prior to spawning because habitat suitable for spawning and development of young is usually different from the habitat where a fish feeds. Movements for spawning are commonly triggered by changes in temperature, since temperature is an important factor in egg survival.

Some fish, such as bass, travel only a small distance to find a spawning bed. Trout travel farther, leaving their feeding territory to swim upstream to a stream's headwaters. Salmon are among the longest-distance travelers, swimming hundreds of miles upstream from the ocean to the spot where they were born.

Fish such as salmon that migrate from a saline ocean environment into freshwater rivers to spawn, are termed *anadromous.* In contrast, fish such as eel, which migrate from fresh water lakes and rivers to the ocean to breed, are called *catadromous.*

Finding a mate and spawning

Prior to spawning, some species undergo changes that make the sexes

Kokanee salmon turn from silver to orange to deep red prior to spawning.

An aquatics biologist strips eggs from a female trout.

look different. For example, male salmon and trout commonly develop a noticeable hook with strong teeth on the lower jaw called a *kype.* They also become more intensely colored. Male salmon also may develop a dorsal hump. Some male minnows and suckers grow horny breeding tubercles that help them drive off other males. Females of many fish species grow much larger than males.

Chemical signals, or *pheromones,* also can help males and females find each other. Once they find each other, some fish gather in large schools while others gather in smaller groups. In some species, females may spawn with several males or vice versa, and in others, males and females pair off.

There are three main methods of spawning. In most species, the female simply releases her eggs into the water to be immediately fertilized by sperm, called *milt,* released from the male. This type of fertilization is called *external fertilization.* In some fish, fertilization occurs within the body of the female before she drops her eggs into the water, which is called *internal fertilization.* Specialized fins help transfer the milt into the oviduct of the female. Lastly, some female fish retain fertilized eggs inside their bodies and later give birth to live young.

Protecting the eggs

Some fish scatter their eggs over the bottom, others attach them to aquatic plants, while still others let them drift in the water. For example, when suckers spawn, groups of males gather on a gravel riffle and wait for females to enter from a pool downstream. As the female enters the group of males, the fish rapidly spawn and the fertilized eggs are randomly dispersed. With little protection for the eggs, such species usually lay many eggs to balance out the numbers lost to predation and other hazards.

Other fish species, such as salmon and trout, make an attempt to hide their eggs. Using their powerful tails, females dig out a depression (called a *redd*) along the bottom of a gravel streambed and deposit their eggs in the depression. After the eggs are fertilized, they are covered with gravel and left to develop on their own. In some species, males defend the redds from other males.

Many fish protect their eggs and young after spawning. These fish typically produce fewer eggs than fish that scatter or hide their eggs because the care they give their young leads to higher survival rates. Unlike most land animals, the male of such fish species most often devotes his time to protecting the young. The males may practice elaborate courtship rituals to lure females to the spawning site they've selected. After spawning, not only do the males guard the eggs and young against predators, they also keep the eggs free of debris and fan them to keep a current of oxygen-rich water flowing over them.

Some males guard their eggs and young by carrying them around after spawning. Most of the fish that protect their eggs and young, however, build nests near vegetation, rocks or logs to shelter the eggs and young. The most common "nest builders" in North America are members of sunfish and black bass families. These fish often nest in large colonies. Dur-

ing breeding, female bluegills swim through the nesting area to scope out the males and their nest sites. Female bluegills seem to prefer spawning with the males that put on the most impressive display, have the strongest color patterns and own the best nest sites. Some smaller males hang out on the fringes of the nesting colony, sneaking in to deposit some of their own milt when spawning takes place. Other small males gain access to the nesting colony by adopting similar color patterns to the females, which tricks the males into thinking the small males are females.

Male bass build their nest in a shallow, rocky area that is warmed by the direct rays of the sun for most of the day. They then coax females to the nest to lay their eggs. After a brief day or two of spawning, the male guards his nest with great vigor, ramming his snout into any intruders to drive them away.

Other fish, including sculpins, darters, minnows and catfish, build nests that are hidden in caves, cavities and burrows, or beneath rocks or logs.

The eggs develop

After fertilization and contact with water, the eggs harden and cell division begins the formation of the embryo. The embryo first develops eyespots and organs and eventually a tail. When the egg hatches, the tail of the embryo breaks out of the shell first and the embryo becomes a free-swimming larva. How long it takes an embryo to become a larva varies between species and also depends on water temperature (the warmer the water is, the faster the embryo develops). Trout eggs often take two to three months or even longer to hatch.

The developing larva (or *alevin*) gets nourishment from a yolk sac attached to it. Again, how long the yolk sac lasts as a food source depends on the species and water temperature. Once the yolk sac is depleted, the tiny *fry,* as it is now called, must feed on its own. Young fish are considered juveniles until they reach sexual maturity and begin spawning.

Large fish, long life

How long different fish live is not well known but, in general, larger fish species tend to live longer than smaller species. Most fish probably do not live longer that 10 to 15 years and many, such as killifishes and certain minnows, may live less than a year. Others, such as whale sharks, sturgeons, groupers and carp, can live a century or more.

Biologists can determine the age of bony fishes by examining a fish's vertebrae, certain bones, scales and otoliths (also called earstones, these are small, flat, oval bones found inside the heads of bony fishes).

The contents of these jars show early stages of fish development—from left to right, fish eggs, sac fry and fry.

As fish grow, their bones and scales form thin visible layers called *circuli.* Similar to the growth ring of a tree, when growth is faster the circuli are widely separated, forming a light band. During the winter, when water temperatures are cooler and fish feed less, growth is slower and the circuli are crowded closer together, forming a darker band. A pair of bands—one light and one dark—forms an annulus, which indicates a year of growth. For most fish with scales, a biologist can remove a scale and count the growth rings. Spines, otoliths or vertebrae are used to determine age in fish without scales. Fish have to be killed to read otoliths or vertebrae. Tagging studies also are useful for learning about age and growth in fish. If captured again, tagged fish can be weighed and measured to learn how much they've grown since the last time they were examined.

Next time you catch or see a fish in one of Utah's lakes or streams, it can be fun to think about its life and how it came to be.

Free resources, activities, literature connections and a list of Web sites for educators and youth related to this article can be viewed online at *wildlife.utah.gov/projectwild/magazine.* If you are unable to access the Internet, contact Project WILD at (801) 538-4719 or e-mail *dianavos@utah.gov* to obtain the information.

Getting WILD! Utah's WILD Notebook is produced by Utah's Project WILD program. WILD workshops, offered by the Utah Division of Wildlife Resources, provide teachers and other educators with opportunities for professional development and a wealth of wildlife education activities and materials for helping students learn about wildlife and its conservation. For a current listing of Project WILD educator workshops, visit the Project WILD Web site at *wildlife.utah.gov/projectwild* or e-mail *DianaVos@utah.gov*.

Educator resources

The following resources for teachers are available on request by contacting Project WILD at (801) 538-4719:

Utah Fish Characteristics—General information, physical features, habitat, feeding behavior and spawning behavior of selected Utah fish species.

Kokanee Salmon Poster—Colorful and educational poster featuring the life cycle of the fascinating Kokanee salmon.

Kokanee Salmon, Wildlife Notebook Series #10—Informative four-page wildlife fact sheet discussing life history and management of this species.

A Fish Riddle—Activity sheet for students to practice aging a fish by examining the growth rings on a fish's scale.

Life cycle of a fish diagram

List of UDWR Aquatic Education Teacher Resources—"Fishing Box" that is available for loan by teachers includes samples of fish eggs, larvae and fry.

Books for learning more

A Fish Hatches by Joanna Cole, Morrow, 1978.

Fish: An Enthusiast's Guide by Peter B. Moyle, Univ. of California Press, 1993.

Fishes of the Great Basin: A Natural History by William F. Sigler and John W. Sigler, Univ. of Nevada Press, 1987.

Discovering Salmon: A Nature Activity Book by Nancy Field and Sally Machlis, Dog-Eared Publications, 1996.

Biologists harvesting smallmouth bass fry from an artificial nest box.

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Northeastern Region Office
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(435) 781-9453

Southeastern Region Office
475 West Price River Drive, Suite C, Price, Utah 84501
(435) 636-0260

Southern Region Office
1470 North Airport Road
PO Box 606, Cedar City, Utah 84721-0606
(435) 865-6100

Poaching hotline: 1 (800) 662-DEER

Web site address: wildlife.utah.gov

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